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2345/101**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/403938INTERNATIONAL APPLICATION NO.
PCT/EP98/02204INTERNATIONAL FILING DATE
(15.04.98)
15 April 1998PRIORITY DATE CLAIMED:
(29.04.97)
29 April 1997**TITLE OF INVENTION****METHOD FOR TRANSMITTING INFORMATION**

APPLICANT(S) FOR DO/EO/US

DASSOW, Heiko; FROHNHOFF, Birgit and TERLINDE, Egbert

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
 - ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information: Preliminary Examination Report and International Search Report.


09/403938

EXPRESS MAIL CERTIFICATE"EXPRESS MAIL" MAILING LABEL NUMBER 54179103727DATE OF DEPOSIT 10/29/99TYPE OF DOCUMENT National phase appn of Durow et alSERIAL NO. _____ FILING DATE Honolulu

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Title: Method for Transmitting Information

[2345/101]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors : Heiko DASSOW et al.
Serial No. : To Be Assigned
Filed : Herewith
For : METHOD FOR TRANSMITTING INFORMATION
Examiner : To Be Assigned
Art Unit : To Be Assigned

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

SIR:

Kindly amend the above-identified application before examination, as set forth below.

IN THE DRAWINGS:

Please amend the drawings as indicated in the attached red-marked sheet.

IN THE SPECIFICATION:

Please amend the specification as follows:

On page 1, before line 1, insert:

--FIELD OF THE INVENTION--.

On page 1, line 1, before "invention", insert --present--.

On page 1, before line 5, insert:

--BACKGROUND INFORMATION--.

EL17910372745

On page 5, before line 22, insert:
--SUMMARY OF THE INVENTION--.

On page 5, line 22, replace "The" with --An--, and before "these", insert --at least--.

On page 5, line 31, replace "The" with --Some of the--.

On page 6, line 1, delete "primarily".

On page 6, line 6, after "summarize", insert --some of--.

On page 6, line 9, after "e-mail", insert --for example,--.

On page 7, line 6, replace "typically" with --for example,--.

On page 7, line 22, delete "The advantages of".

On page 7, line 23, replace "an" with --An--, and replace "are indispensable" with --is advantageous, for example,--.

On page 8, line 4, replace "invention, therefore," with --invention--.

On page 9, line 1, replace "can be so conceived" with --contemplates--.

On page 9, line 3, replace "This further refinement provides the customer" with --The customer is provided--.

On page 9, line 11, replace "but" with --but also--.

On page 9, line 12, replace “use, as well” with --use--.

On page 10, line 7, replace “The” with --An--.

On page 10, delete lines 12-28, and insert:

--BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a block diagram illustrating a first embodiment of a facility for realizing a method according to the present invention.

Figure 2 shows a block diagram illustrating a second embodiment according to the present invention.

Figure 3 shows a schematic representation illustrating management of a part of a public telecommunications network used by a subscriber according to the present invention.

Figure 4 shows a schematic representation illustrating a text-based transmission of CMIP-based management information between a CNM customer and a network operator.--

On page 10, before line 30, insert:

--DETAILED DESCRIPTION--

On page 14, line 7, after “For”, insert --at least--.

On page 21, line 6, before “depending”, insert --for example,--.

On page 24, delete line 1, and insert:

--WHAT IS CLAIMED IS:--

IN THE ABSTRACT:

Please amend the Abstract, as follows:

Delete line 1, and insert:

-- Abstract Of The Disclosure--.

Line 5, delete "(ASN.1)".

Delete line 6, and insert:

--transmitted encoded as text. A form of plain-text encoding may generally be used--.

IN THE CLAIMS:

Please cancel claims 1-11 without prejudice.

Please add the following new claims:

12. (New) A method for transmitting information, comprising the steps of:
using a data structure that is defined by a formal language called Abstract Syntax
Notation One; and
transmitting information encoded as text.
13. (New) The method according to claim 12, wherein the step of transmitting includes the step
of transmitting information encoded as plain text.
14. (New) The method according to claim 13, further comprising the step of:
transmitting a designation of a data type with each piece of the transmitted
information, the designation of the data type being defined by the formal language called
Abstract Syntax Notation One.
15. (New) The method according to claim 14, wherein the step of transmitting the designation
includes the steps of placing the designation in front of each piece of the transmitted information
and separating the designation from each piece of the transmitted information by a predefined
separator character.

16. (New) The method according to claim 15, wherein the step of separating the designation includes the step of separating the designation from each piece of the transmitted information by an equal sign.
17. (New) The method according to claim 12, further comprising the step of:
outputting a form of the encoded information by using a standard, readily available output facility.
18. (New) The method according to claim 12, further comprising the step of:
transmitting the encoded information via Common Management Information Protocol, the encoded information relating to management of public telecommunications networks.
19. (New) The method according to claim 12, further comprising the step of:
transmitting the encoded information between a subscriber system and a public telecommunications network, the encoded information relating to a subscriber system performed management of the public telecommunications network.
20. (New) The method according to claim 12, further comprising the step of:
creating an e-mail interface for transmitting the text-encoded information.
21. (New) The method according to claim 12, further comprising the step of:
using encoding tables, the encoding tables being adaptable to character sets of transmitting systems.
22. (New) The method according to claim 12, further comprising the steps of :
automatically encoding and sending management information; and
automatically receiving and decoding the management information.

Remarks

This Preliminary Amendment cancels, without prejudice, claims 1-11 in the underlying PCT Application No. PCT/EP98/02204. This Preliminary Amendment further adds new claims 12-22. The new claims conform the claims to U.S. Patent and Trademark Office rules and do not add new matter to the application.

The above amendments to the specification and abstract conform the specification and abstract to U.S. Patent and Trademark Office rules, and do not introduce new matter into the application.

The underlying PCT Application No. PCT/EP98/02204 includes an International Search Report dated January 11, 1999. The International Search Report includes a list of documents that were uncovered in the underlying PCT Application. A copy of the International Search Report is included herewith. Also enclosed is a translation of the International Search Report.

The underlying PCT Application also includes an International Preliminary Examination Report dated July 7, 1999. A copy of the International Preliminary Examination Report is included herewith. Also enclosed is a translation of the International Preliminary Examination Report.

It is respectfully submitted that the subject matter of the present application is new, non-obvious, and useful. Prompt consideration and allowance of the application are respectfully requested.

Respectfully submitted,

Dated: 10/29/99

By: 

Richard L. Mayer
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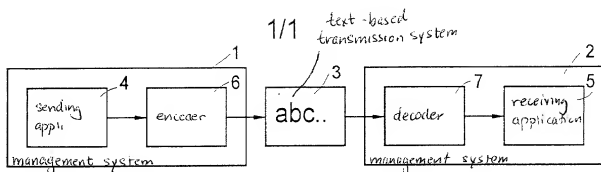


Fig. 1

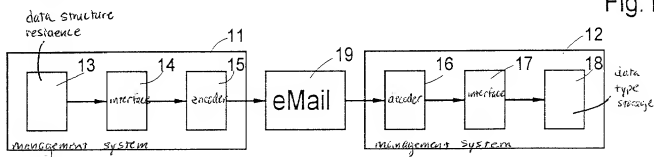


Fig. 2

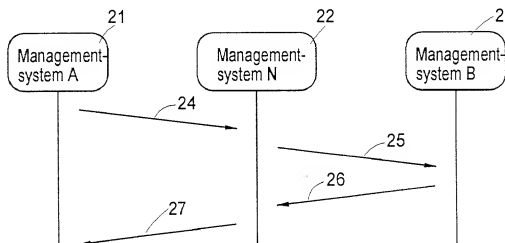


Fig. 3

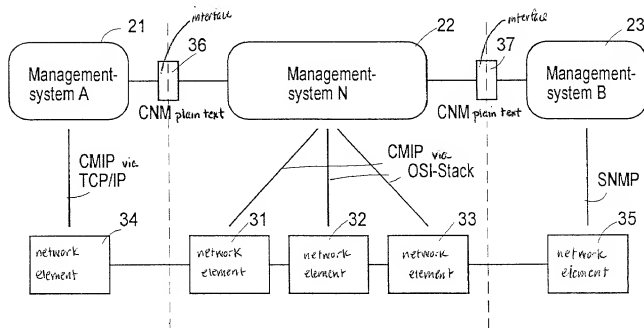


Fig. 4

METHOD FOR TRANSMITTING INFORMATION

The invention relates to a method for transmitting information using a data structure that is defined by the formal language called Abstract Syntax Notation One (ASN.1).

5 Reference is made to the following documents:

[NMFTR107] Network Management Forum
Forum TR107: ISO/CCITT and Internet Management:
Coexistence and Interworking Strategy
10 Issue 1.0 September 1992

[M.3010] ITU-T Recommendation M.3010
Maintenance: Telecommunications Management
Network
15 Principles for a Telecommunications Management
Network 10/92

[X.160] ITU-T Recommendation X.160
Data Networks and Open System Communications
20 Public Data Networks - Maintenance
Architecture for Customer Network Management
Service for Public Data Networks 7/94

2L179103 72 745

- [X.200] Data Networks and Open System Communications
Open System Interconnection -
Model and Notation
Information Technology -
Open System Interconnection
Basic Reference Model
Geneva, 1994
- [X.208] ITU-T Recommendation X.208
Specification of abstract syntax notation one
(ASN.1)
Information technology
Open System Interconnection 1988
- [X.209] ITU-T Recommendation X.209
Specification of Basic Encoding Rules for
Abstract Syntax Notation One (ASN.1)
- [X.710] ITU-T Recommendation X.710
Data Communication Networks
Open Systems Interconnection
Common Management Information Service
Definition for CCITT Applications
Geneva, 1991
- [X.711] ITU-T Recommendation X.711
Data Communication Networks
Open Systems Interconnection
Common Management Information Protocol
Specification for CCITT Applications
Geneva, 1991

[X.722] ITU-T Recommendation X.722
Data Communication Networks
Open Systems Interconnection
Structure of Management Information
Guidelines for the Definition of Managed
Objects
Geneva, 1992

[RFC 1157] Network Working Group RFC 1157
Simple Network Management Protocol (SNMP)

[RFC 1085] Network Working Group RFC 1085
ISO Presentation Services on top of TCP/IP-
based internets
M. Rose, Performance Systems International
K. McCloghrie, Hughes LAN Systems
December 1988

[RFC 1189] Network Working Group RFC 1189
Common Management Information Services and
Protocols for the Internet (CMOT and CMIP).
U.S. Warrier, L. Besaw, L. LaBarre, B.D.
Handspicker.
historic protocol, not recommended status
Oct-01-1990.

[RFC 1214] Network Working Group RFC 1214
OSI Internet Management: Management Information
Base
L. Labarre
historic protocol, not recommended status

April 1991

[RFC0793] Network Working Group RFC 0793
5 Transmission Control Protocol
J. Postel. September 1981

OSI Abstract-Data Manipulation API (XOM)
CAE Specification
10 Issue 3
x/Open Company Ltd
ISBN 1 85912 175 6

The following abbreviations are used:

15 ASN.1 Abstract Syntax Notation One [X.208]
BER Basic Encoding Rules [X.209]
CMIP Common Management Information Protocol [X.711]
CMIPDU Common Management Information Protocol Data Unit [X.711]
20 CMIS Common Management Information Service [X.710]
CNM Customer Management Network [X.160]
DCF Data Communication Function
DCN Data Communication Network
25 GDMO Guidelines for the Definition of Managed Objects [X.722]
OSI Open System Interconnection [X.200]
SNMP Simple Network Management Protocol [RFC1157]
TCP/IP Transmission Control Protocol / Internet Protocol [RFC0793]
TMN Telecommunication Management Network [M.3010]
30 XOM X-OPEN, Interface for handling ASN.1

Abstract Syntax Notation One (ASN.1) [X.208] permits the formal specification of data types. It is used for the platform-independent definition of a variety of services and protocols of the OSI 7-layer model (Open System Interconnection [X.200]), among other things. To transmit the stored information, whose structure is defined by ASN.1, there exists a series of methods to encode ASN.1 values, such as the Basic Encoding Rules (BER) [X.209]. The BER-encoded information can then be transmitted in binary form with the help of any desired method. In general, transmission protocols from the TCP/IP or OSI family are used.

At the present time, transmitting the various Protocol Data Units (PDUs) from layer 7 of the OSI 7-layer model, as defined in ASN.1, with the help of a purely OSI-based protocol stack, entails substantial outlay. For this reason, the use of these protocols is often avoided, or the lower layers of the OSI protocol stack are replaced with an already existing TCP/IP protocol. As an example of a number of these methods, one might mention CMIP over TCP/IP (CMOT) [RFC1189].

The object of the present invention is to avoid these disadvantages associated with the binary transmission of information, whose structure is defined by ASN.1.

This objective is achieved according to the present invention by transmitting the information encoded as text. A form of plain-text encoding is generally to be used which allows the encoded contents to be read without additional tools.

The advantages of the method according to the present

invention lie primarily in the fact that text-based transmission protocols are generally in very widespread use and correspondingly lower in price than binary transmission procedures. In addition, fault localization is much simpler with plain text encoding, so that the costs for implementing any given application are much lower. To summarize the advantages:

- Due to the widespread use of text-based transmission protocols, such as e-mail, the number of computers that can be reached using such protocols is much greater than those that can be reached when binary transmission methods are used.
- So-called firewalls used to insulate companies' internal networks are often open only for text-based transmission protocols.
- No additional tools are needed to localize faults in encoded ASN.1 information, since the encoded information is in a form that can be read by human programmers.
- The use of very simple protocols means that no great demands are made in terms of the computing power needed for encoding and transmission, so that even lower-end PCs are suited for this purpose.
- Transmitting and receiving facilities need not contain complex protocol stacks. The software needed for text-based transmission is already a part of many operating systems.

Unlike BER encoding, the method according to the present invention makes it possible to decode the received data without having to access a reference to the ASN.1 definition internal to the application.

A particularly advantageous further development of the method according to the present invention is the fact that each piece of information transmitted has its data type defined according to ASN.1 transmitted with it, with the data type generally preceding the information and being separated from it by a predefined separator, typically an equal sign.

This further development allows a use of the method according to the present invention that is particularly useful to the user, in that the information is encoded as text and thus can be output using standard output devices. It also allows simple entry by the user as well as long-term storage of the information in text encoded form.

The protocol that will be generally used in the future for managing public telecommunications networks - also called networks in the following - is CMIP [X.711]. In this context, telecommunications networks can be networks for the transmission of voice, data and images. The structure of the CMIPDU has been formally defined with the aid of ASN.1. The management information transmitted via CMIPDUs is encoded in conformance with the Basic Encoding Rules. The advantages of an OSI protocol stack are indispensable for transmitting the CMIP-based management information, particularly for long distances or due to stringent quality requirements. At the same time, however, there are applications for which a much simpler and more cost-effective approach suffices for the transmission of management information. In addition to the implementation of CMIP for SNMP, which is in widespread use in local networks, CMIP is currently also transmitted via TCP/IP, which is technologically simpler than the OSI protocols of the

lower protocol layers.

A further refinement of the method according to the present invention, therefore, provides that the information to be transmitted via CMIP relates to the management of public telecommunications networks. This further refinement makes it irrelevant whether the plain-text encoding used is based on the fact that CMIP was defined in ASN.1, or whether the text-based encoding rules were created independently of that fact.

In addition to the above-mentioned advantages of the method according to the present invention, this further refinement, i.e., text-based CMIP transmission, makes the use of CMIP practical even in cases where cost considerations rule out the more costly transmission via an OSI protocol stack.

In the future, operators of public networks will provide their customers with a management interface by way of which the customers will be able to initiate management operations relevant to the part of the public network they have leased. The customers will then be able to transmit all data that they wish to the operating company via this interface.

An example of this is a request for a dedicated line between site A and site B of a customer's private network. The two sites are to be linked via the public network. To this end, another further development of the method according to the present invention provides that the information be transmitted between a subscriber and a public network and/or its management systems, and that it relate to network management to be performed by the subscriber.

In particular, the present invention can be so conceived that an e-mail interface is created for text-encoded information. This further refinement provides the customer with a cost-effective, yet reliable interface to the network operator. It does so without excluding the advantages of CMIP as a management protocol.

Such an interface between the customer's private management system and that of the network operator makes it possible for customers to not only perform management operations on their own local network, but on that part of the public network which they use, as well. This is referred to as Customer Network Management. A typical application is, for example, a customer-specific configuration of the network. Immediate reporting of identified faults to the customer is another example of CNM, as is the provision of specific statistical data.

Another further refinement of the present invention includes using character tables for encoding and decoding the information to allow a simple and flexible adaptation to the limited character set of the transmission system. If, for example, a transmission protocol is not able to transmit the "{" and "}" characters, a different typical character can be used instead, without having to fundamentally alter the encoding rules. Thus, without entailing additional technical outlay, the parallel use of different character tables makes it possible to support a plurality of transmission media using different character sets within one and the same application.

Another further refinement of the method according to the

present invention provides that the management information be encoded and transmitted automatically, as well as received and decoded automatically.

5 In the network operator's area, automatic conversion of the text-based transmission to an OSI protocol stack is thus possible at any time. The advantage of this architecture is the fact that not all customers have to administer their own OSI stacks, but rather that the network operator can offer
10 this as a centralized service for all customers.

Embodiments of the present invention are shown in the drawing using several figures and explained in more detail in the following description. It shows:

- 15 Fig. 1 A first embodiment of a facility for realizing the method according to the present invention;
- 20 Fig. 2 a second exemplary embodiment, also as a block diagram;
- Fig. 3 a schematic representation of the management of a part of a public telecommunications network used by a subscriber; and
- 25 Fig. 4 a schematic representation of a text-based transmission of CMIP-based management information between a CNM customer and a network operator.

30 In the embodiment shown in Figure 1, two management systems 1 and 2 are interconnected to exchange information via a text-

based transmission system 3. The useful information to be transmitted can exist in the sending and receiving applications 4 and 5 for management systems 1 and 2 in a variety of proprietary data formats. The structure of these data formats is determined by the tools used to create the applications. In 6 and 7, this useful information is encoded and decoded in accordance with ASN.1 and, additionally, in accordance with the method of the present invention.

Figure 2 shows one possible realization of the architecture depicted in Figure 1. Information is transmitted from C data structures, residing in a first management system 11 at 13, to management system 12, where it is stored as C/C++ data types at 18.

The pieces of information resident at 13 are first fed to an XOM interface 14 and encoded there as XOM objects, so that they can be implemented in conformance with ASN.1. These objects are then converted using the method according to the present invention into text-based transmission protocols, which are transmitted as e-mail 19 and received by management system 12. There, they are first decoded at 16 and converted into C++ objects, and subsequently stored at 18 as C/C++ data types.

Figure 3 depicts a scenario where a customer asks the operator of a public network to connect two sites (A and B) via a dedicated line. The customer's request 24 is made via his or her management system 21 at site A to management system 22 of network operator N. This management system checks in its own network to see if the request is feasible and then routes it

to management system 23 at site B of the customer (25). Once message 26 that the corresponding part of the dedicated line has been able to be successfully set up, is received from there, the through-connection is established in the public network, and the result "line set up" is relayed to site A (27).

Figure 4 clarifies the text-based transmission of CMIP-based management information between a CNM customer and the network operator. Management system 21 at site A and the customer's management system 23 at site B are linked to management system 22 of network operator N, each via a CNM interface 36 and 37, via which the information that has been encoded as plain text in conformance with the method of the present invention is transmitted.

The customer's management systems 21 and 23 have access to the customer's network elements 34 and 35, respectively. For example, this takes place at site A with the help of CMIP via TCP/IP, while at site B, SNMP is used. Management system 22 of network operator N, whose domain is indicated by the dotted lines in Fig. 4, has access to network elements 31 through 33 of the public network. This access is performed using CMIP via a 7-layer OSI protocol stack.

Network operator N offers the customer a CNM service, which enables the customer to use its own management application or one provided by the network operator to route its management requests to management system 22 of the public network. The management information to be transmitted is automatically encoded as plain text at the customer's site within the

customer's management application, and is transmitted via a text-based protocol to the network operator's management system 22. This message is either received automatically by management system 22 of the network operator or that of a CNM
5 service provider, and is further processed directly; or a conversion takes place at 36 and 37 to an OSI protocol stack and to an OSI-based transmission to the network operator's management system.

10 Management information can also be advantageously communicated to the customer's management systems 21 and 23 using the method of the present invention. To this end, a plain-text message is automatically routed by network operator N to the customer. CNM customer's management application automatically
15 receives and decodes this text message, in order to route the transmitted management information onward.

The ASN.1 encoding according to the present invention is carried out in accordance with an established procedure. As a
20 general principle, for each ASN.1 type, the tag is first encoded in the form of an appropriate name (e.g., "INTEGER" for Universal Tag 2) that conforms with the ASN.1 standard, and a "=" character is inserted as a separator. The value is then encoded in the manner predetermined for that type. If an
25 ASN.1 data type, for its part, is made up of other data types, then, when its value is encoded, the tags and values of the data types it contains are also encoded.

30 Two variants are defined for the encoding rules, both of which are contained in this patent claim. The standard variant suffices completely for encoding the ASN.1 version and is

simple to implement. In the case of the expanded variant, the encoded text is provided with additional information taken from the ASN.1 type definition. This clearly simplifies fault localization, in comparison to both the standard variant of plain-text encoding and the binary-encoded form. However, using the expanded variant increases the outlay entailed in application development. For that reason, it is also permissible to use only selected parts of the expanded encoding, as long as this is done consistently in the transmitter and receiver. If the expanded variant is provided for encoding a special data type, it is explained below in the description of the appropriate data types.

The following sections specify the ASN.1 definition relevant to the description of the encoding rules for the individual data types, and give one or more encoding examples.

BOOLEAN

Encoding of a Boolean data type is performed by encoding the text "BOOLEAN" for the type and the texts "TRUE#" or "FALSE#" for the value:

ASN.1 definition	Encoding (several examples)
------------------	-----------------------------

Bo1 ::= BOOLEAN	BOOLEAN=TRUE#
-----------------	---------------

	BOOLEAN=FALSE#
--	----------------

INTEGER

An integer value is designated by the text "INTEGER" and the corresponding value in the format of a decimal number. Only negative numbers are to be given a sign. The encoding of the value is terminated by a "#" character.

ASN.1 definition	Encoding (several examples)
Int ::= INTEGER	INTEGER=123#
	INTEGER=-123#

5 BIT STRING

A bit string is encoded using the text "BIT STRING". The value is encoded by a binary list contained in "{}" characters and identified by a preceding "B" for binary, and by the number of encoded elements. Hexadecimal encoding instead of binary encoding is identified accordingly by an "H". If the number of bits is not an integral multiple of four, the undefined low-order bits (rightmost) are to be encoded using the binary value "0". For both binary and hexadecimal encoding, it is possible in conformance with the ASN.1 definition, to do without the encoding of elements situated at the end, if they are encoded with the value "0".

In the expanded encoding, the identifiers of the elements are listed, whose binary value corresponds to a "1". The beginning of the list is identified by the "{" character, and the end by the "}" character. A "/" character is used as the separator in this list.

ASN.1 definition	Encoding (multiple variants)
25 BitStr ::= BIT STRING {	BIT STRING=B5{01100}
ele(0),	BIT STRING=B3{011}
ele(1),	BIT STRING=H2{70}
ele(2),	BIT STRING=H1{7}
ele(3),	
30 ele(4)	Expanded encoding:

BIT STRING={ele(1)/ele(2)}

```

    BIT STRING=B5{00000}
    BIT STRING=B1{0}
    BIT STRING=H1{0}

```

5 Expanded encoding:
 BIT STRING={ }

OCTET STRING

10 An octet string is encoded using the text "OCTET STRING". The value is encoded through a binary list enclosed in "{}" characters and preceded by a "B" for binary and the number of encoded elements. Hexadecimal encoding can also be used; it is designated by an "H". A "/" character is used as the separator between the individual octet values.

15 ASN.1 definition Encoding
 OctStr ::= OCTET STRING OCTET STRING=B2{11100001/ 11111111}
 OCTET STRING=H2{E1/FF}

20 NULL
 Encoding of the ASN.1 data type null is performed using the text "NULL=NULL#".

ASN.1 definition Encoding
 25 Null=NULL NULL=NULL#

OBJECT IDENTIFIER

30 The ASN.1 data type object identifier is encoded using the text "OBJECT IDENTIFIER". The value is encoded by listing the ordinal numbers of the nodes in the registration tree, from the root element to the registered element, and preceding the

listing with the encoding of the text "NUMERIC". The numerical values of this list are separated by periods. The encoding of the value is terminated by "#" characters.

5 In expanded encoding, designated by the text "Symbolic", a unique mnemonic identifier is used in place of the less meaningful numeric sequences. That, of course, requires that a clear tabular relationship conforming to a set theory be created between identifiers and object identifiers. A
10 combination of mnemonic identifiers and numerical sequences is not permissible. The encoding of the value is terminated by "#" characters.

ASN.1 definition	Encoding
15 Obj ::= OBJECT IDENTIFIER	OBJECT IDENTIFIER=Numeric, 1.2.2.1.4##

	Expanded encoding
20	OBJECT IDENTIFIER=Symbolic, systemId#

EXTERNAL

The tag of the data type external is encoded using the text "EXTERNAL". The encoding of values of this data type is
25 derived from the encoding rules for the following SEQUENCE:

SEQUENCE

```
{
    direct-reference      OBJECT IDENTIFIER OPTIONAL,
    indirect-reference    INTEGER OPTIONAL,
    data-value-descriptor ObjectDescriptor OPTIONAL,
```

```

encoding          CHOICE
{
    single-ASN1-type    [0] IMPLICIT ANY,
    octet-aligned       [1] IMPLICIT OCTET STRING,
5    arbitrary          [2] IMPLICIT BIT STRING
}
}

```

REAL

10 Real numbers are encoded in scientific notation. The encoding of the value is terminated by "#" characters.

ASN.1 definition	Encoding
Real ::= REAL	REAL=1.23E45#

15

ENUMERATED

The tag of an enumerated type is encoded using the text "ENUMERATED". Values are encoded by specifying the integer associated with the element. The encoding of the value is terminated by "#" characters. In expanded encoding, the element is encoded identically to its definition text.

20

ASN.1 definition	Encoding
Enum ::= ENUMERATED{	ENUMERATED=1#

25

a(0),	
b(1),	expanded encoding:
c(2)	ENUMERATED=b(1)#

SEQUENCE

30 The tag of a sequence is encoded using the text "SEQUENCE". The encoding of the value of a sequence begins with the number

of encoded elements, followed by a "{" character, and terminates with a "}" character. In further specifying the value encoding, we must distinguish between two types of sequences:

5 In a simple sequence, the ASN.1 types contained in the sequence are encoded in the order in which they appear in the definition. The position numbers are placed in front, each separated by a comma. A "/" character is inserted as a separator between these types. Unused optional elements of the
10 sequence are simply left out in the encoding, so that in such cases, the "/" separator character is also not encoded.

ASN.1 definition	Encoding (several examples)
Seq ::= SEQUENCE {	SEQUENCE=2{1, INTEGER=123#/ 15 3, INTEGER=456#)
a INTEGER,	SEQUENCE=3{1, INTEGER=1#/2, BOOLEAN=FALSE#/3, INTEGER=3#}
b BOOLEAN OPTIONAL,	
20 c INTEGER}	

The value of a sequence is defined by encoding the enclosed data type the appropriate number of times, with preceding position number, and each separated by a "/" character.

ASN.1 definition	Encoding (several examples)
Seq ::= SEQUENCE OF INTEGER	SEQUENCE OF=3{1, INTEGER=1#/2, 25 INTEGER=2#/3, INTEGER=3#}
	SEQUENCE=0{}

SET

The tag of the set type is encoded using the text "SET". The encoding of the value begins with the number of encoded elements, followed by a "{" character, and terminates with a "}" character. In further specifying the value encoding, we must distinguish between two kinds of set data types: In a simple set type, the ASN.1 types contained in the definition are encoded in the order in which they appear in the definition. The position numbers are placed in front, each separated by a comma. A "/" character is inserted as a separator between these types. Unused optional elements of the set are simply left out when encoding, so that in such cases, the "/" separator character is also not encoded.

ASN.1 definition	Encoding (several examples)
Set ::= SET	SET=2{1,INTEGER=123#/2,BOOLEAN=TRUE#}
a INTEGER,	
b BOOLEAN,	
c OBJECT IDENTIFIER optional}	

The value of a set of type is defined by encoding the enclosed data type the appropriate number of times, with preceding position number, with each separated by a "/" character.

ASN.1 definition	Encoding (several examples)
Set ::= SET OF INTEGER	SET=3{1,INTEGER=1#/2,INTEGER=2#/ 3,INTEGER=3#} SET={}

Character Strings

Encoding is identical for the various string types and the subtypes derived therefrom. The type is encoded using the text "NumericString", "PrintableString", "TeletexString", "VideotexString", "VisibleString", "IA5String", "GraphicString", "GeneralString", "ObjectDescriptor", "UTCTime" or "GeneralizedTime", depending on which type is involved.

If no special characters are contained, and no characters which cannot be encoded, simple value encoding can be used. It is introduced by the text "simple" and, separated by a "," character, followed by the number of characters included. The text itself then follows as uncoded text, enclosed in curly braces. If encoding is not possible with simple value encoding, expanded encoding is used, which is introduced by the text "complex". Separated by a "," character, the encoding of the number of contained characters follows, and then a "{" character. The codes of the individual characters are then encoded in hexadecimal form, separated by "/" characters from each other. The encoding is terminated by a "}" character.

ASN.1 definition	Encoding (several examples)
Str ::= GeneralString	GraphicString=simple,3{xyz}
	GeneralString=complex,3{78/79/7A}

CHOICE

The choice type is encoded using the text "CHOICE". The encoding of the value of a choice is similar to the encoding of a sequence, and begins with the number "1" for the number of elements encoded in the choice. The encoding of the element contained begins with a "{" character and terminates with a

"}" character. Before the encoding of the type, its position is encoded, separated by a comma.

ASN.1 definition

Encoding (several examples)

```
5 Bsp ::= CHOICE {
    simple.3{A}}
    typ1 INTEGER,
    typ2 GraphicString }
```

CHOICE=1{2,GraphicString=
CHOICE=1{1,INTEGER=123#}

10 ANY DEFINED BY

The type ANY DEFINED BY is defined by the string "ANY". The value of an ANY type is encoded as a type of its own, unlike BER encoding. Since the ANY DEFINED BY type is only permitted within a SEQUENCE or a SET, the example shows the corresponding definition within a sequence definition. For the encoding, first the text "1{" is encoded, and then the type intended for the ANY type. The definition is terminated by the "}" character.

20 ASN.1 definition

Encoding

```
Seq ::= SEQUENCE{
    i INTEGER;
    a ANY DEFINED BY i }
```

SEQUENCE=2{1,INTEGER=1#/2,
ANY={INTEGER=5#}}

25

Referencing an information model:

Unlike plain-text encoding, which can be decoded without knowing anything of the information model, a BER encoding requires a reference to the information model, stored in metadata format. To enable encoding by referencing metadata from within plain-text encoding as well, it is possible for

30

the metadata to be used to precede any type encoding. This metadata is then valid only for that type and any types contained in it.

5	ASN.1 definition	Encoding
	Bsp ::= INTEGER	SetMetaData=Dateiname, INTEGER=123#

What is claimed is:

1. Method for the transmission of information using a data structure that is defined by the formal language called Abstract Syntax Notation One (ASN.1), characterized in that the information is transmitted encoded as text.

2. Method according to Claim 1, characterized in that plain-text encoding is used.

3. Method according to Claim 2, characterized in that for each piece of information to be transmitted, the designation of the data type as defined by ASN.1 is transmitted as well.

4. Method according to Claim 3, characterized in that the designation is placed in front of and separated by a predefined separator character from the information.

5. Method according to Claim 4, characterized in that the predefined separator character is an equal sign.

6. Method according to one of the preceding Claims, characterized in that the form of the information encoded as text can be output with the help of a standard, readily available output facility.

7. Method according to one of the preceding Claims, characterized in that the information to be transmitted via CMIP relates to the management of public telecommunications networks.

8. Method according to one of the preceding Claims, characterized in that the information is transmitted between a subscriber and a public telecommunications network and relates to subscriber performed management of the telecommunications network.

9. Method according to one of the preceding Claims, characterized in that an e-mail interface is created for the text-encoded information.

10. Method according to one of the preceding Claims, characterized in that, due to the use of encoding tables, the encoding is flexibly adaptable to the character sets of the transmitting systems.

11. Method according to one of the preceding Claims, characterized in that the encoding and sending of the management information and the receiving and decoding of that information all take place automatically.

Abstract

- 5 In a method for transmitting information using a data structure that is defined by the formal language called *Abstract Syntax Notation One* (ASN.1), the information is transmitted encoded as text, generally as plain-text encoding. This enables the use of text-based transmission media, which are in widespread use. Furthermore, it enables fault localization without the use of additional tools.

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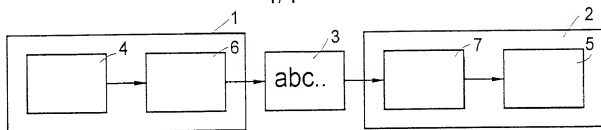


Fig. 1

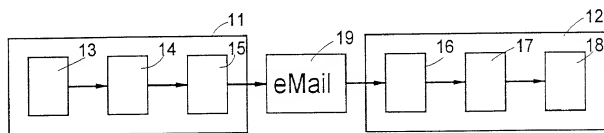


Fig. 2

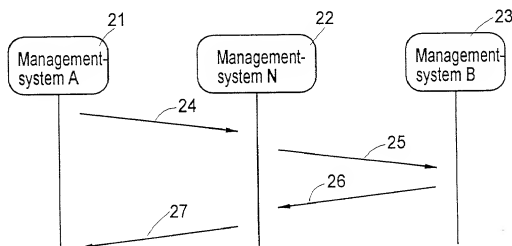


Fig. 3

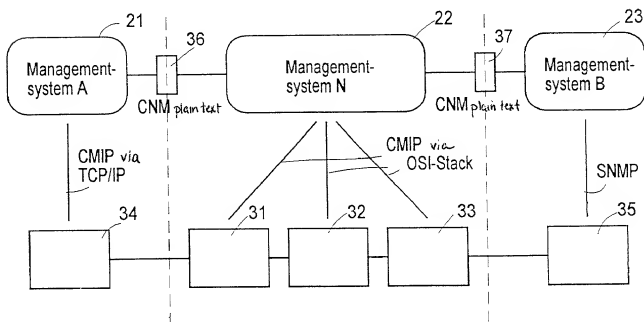


Fig. 4

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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
DECLARATION AND POWER OF ATTORNEY	ATTORNEY'S DOCKET NO. 2345/101

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name,

I believe I am an original, first, and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled **METHOD FOR TRANSFERRING INFORMATION**, the specification of which was filed as International Application No. PCT/EP98/02204 on 15 April 1998 and filed herewith in the United States Patent and Trademark Office.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

PRIOR FOREIGN APPLICATION(S)

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. § 119
GERMANY	197 17 948.7	29 April 1997		YES

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys:

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I declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful statements may jeopardize the validity of the application or any patent issuing thereon.

1-00

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